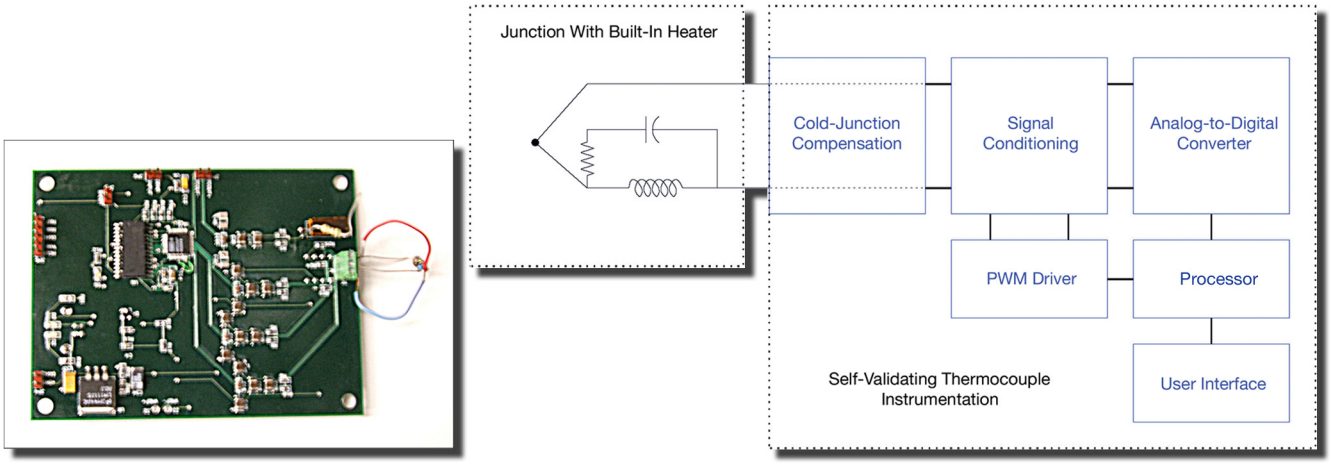
National Aeronautics and Space Administration

Technology Opportunity

Self-Validating Thermocouple

The National Aeronautics and Space Administration (NASA) seeks to license a Self-Validating Thermocouple (SVT). The concept of self-validating sensors, specifically those of thermocouples, has been investigated for many years. The advantage of this technology is that it can continuously monitor and validate sensor measurements to determine their health. Developed at Kennedy Space Center (KSC), the SVT is capable of detecting thermocouple probes open circuits, short circuits, and unnoticeable faults such as probe de-bonding and probe degradation. The SVT differentiates between bonded and de-bonded conditions and provides cold-junction compensation so that the most common types of thermocouples, such as T, K, J and E, can be used.



Potential Commercial Uses

Thermocouples are electronic sensors for measuring temperature for use in a wide variety of applications where temperature is an important parameter in a measurement or control system. Certain industries have applications that are very sensitive to temperature change. These include:

- Food, beverage, and drug.
- Semiconductor manufacturing.
- Military/aerospace.
- Power utilities.

Other processes that may benefit from this technology include:

- Glass manufacturing.
- Plastic injection molding.
- Residential appliance operation.

Benefits

- Eliminates redundant thermocouple measurements
- Saves on operations and maintenance costs
- Maximizes failure-detection capabilities
- Provides valid and reliable data automatically or by request
- Can be used with common thermocouple types

Explore. Discover. Understand.

The Technology

The most common causes for thermocouple measurements failure are related to the physical bonding between the sensor element and the surface it is attached to. The SVT detects open or short faults and identifies the degradation of the thermocouple as well as its bonded or de-bonded state. The design uses an integrated approach by combing real-time measurement/analysis, statistical tools, and advanced circuit design to effectively determine the sensor measurements and health to correct the state of the system. The SVT instrument is composed of a cold-junction compensator, signal conditioner circuitry, thermocouple excitation, PWM, A/D converter, a processor, power, and a USB interface.

Options for Commercialization

NASA seeks qualified companies to commercialize the Self-Validating Thermocouple technology. This and other technologies are made available by the KSC Technology Transfer Office. NASA transfers valuable technology to industry through patent and copyright licenses, cooperative agreements, and reimbursable and nonreimbursable Space Act Agreements.

Contact

If your company is interested in the Self-Validating Thermocouple technology or if you desire additional information, please reference Case Number KSC-12875 and contact:

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Commercialization Checklist

- ✓ Patent Pending
- U.S. Patent
- Copyrighted
- ✓ Available to License
- Available for no-cost transfer
- Seeking industry partner for further codevelopment